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Agricultural Research - - - 1948

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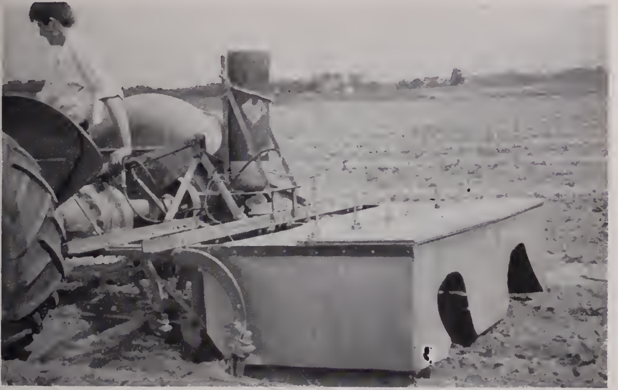

The cultisoler, designed for and used with a tractor-cultivator, cultivates beans and controls the bean beetle by means of an aerosol spray in a single operation.

Maryland Agricultural Experiment Station.

Sixty-first Annual Report
Agricultural Experiment Station

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Bulletin No. A50

1947 - 1948

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To the Governor of Maryland, the Board of Regents, and the President of the University of Maryland

I transmit herewith the Sixty-First Annual Report of the University of Maryland Agricultural Experiment Station, as established by Act of Congress, March 2, 1887, containing an account of research and experiments conducted during the fiscal year ending June 30, 1948, and a statement of the receipts and disbursements for the same period.

W. B. KEMP,

Director.

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W. B. Kemp, Director

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SEED INSPECTION

F. S. Holmes, M.S., Chief Seed Inspector.

The Station is located on the B. & O. R. R., City and Suburban Electric Car Line and the Baltimore-Washington Boulevard, eight miles North of Washington, D. C. Telephone—Warfield Exchange. Visitors will be welcome at all times and will be given every opportunity to inspect the work of the Station in all its departments.

The Bulletins and Reports of the Station will be mailed free of charge to all residents of the State who request them.

Address:
AGRICULTURAL EXPERIMENT STATION
College Park, Maryland

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Agricultural Research - - - 1948

Sixty-First Annual Report

For the Fiscal Year ending June 30, 1948

By W. B. Kemp, Director

A NOTABLE development in recent years in research at the agricultural experiment stations is the increasing cooperation among stations. In the early years of agricultural research problems chosen for study usually were relatively simple ones. There was not much need for team work in the attack upon them. Since that time two changes have taken place. One is the necessity for attack upon complex problems which require teamwork for their solution. The other is the growth of national scientific societies in various fields of work. Meetings of these societies permit close acquaintance among men with common research interests, even though they may work in different states. This force, probably more than any other, has encouraged such men to unite their efforts. Workers in the Federal research bureaus frequently have been able to help in coordinating such interstate cooperation.

Today, practically every open pedigree corn hybrid that is used widely is an interstate hybrid. That is, the inbred lines from which it is put together were developed in different states.

Those who wrote Title I of the Flannagan-Hope Act which was passed by the Congress in 1946 appreciated the value of this cooperation. Certain of the funds provided under this Act can be used only to finance research of a regional nature in which the interested states cooperate. As a consequence, added impetus has been given to a practice which had been growing in recent years.

With this change, desirable as it is, a growing difficulty confronts the individual station. When those responsible for its support ask for a record of its accomplishment, the record for certain projects cannot be given without unscrambling the egg—and the egg cannot be unscrambled. As a consequence, more and more of the accomplishments must be presented as those of agricultural research; not of a particular station. However, this difficulty need not disturb the workers, for mankind benefits increasingly from the united effort.

Agricultural Economics

Trends in Farm Mortgage Financing

A study of farm mortgages recorded in five counties of Maryland for an eleven year period shows that recordings in 1946 were 182% above the 1936 level.

Nearly two-thirds of the farm mortgages signed in 1946 were written for one year or less. One year mortgages may be satisfactory during good times, but they are a hazard to the borrower if money becomes scarce, or there is a general business recession. Past experience shows that many short term mortgages are foreclosed when a drop in farm prices occurs.

Last year, for the first time since 1927, farm mortgage debt started to rise. The trend in farm mortgage debt is continuing upward, which is considered an unhealthy sign. However, the farmer who is cautious during the boom is fairly secure if he is relatively free of debt and has some accumulated savings.

Father-Son Farm Business Arrangements

The nature and extent of father-son business arrangements, difficulties to be overcome, and the desirable features of such arrangements were investigated for the State of Maryland.

A total of 211 farmers and 51 rural leaders were interviewed. The majority of father-son arrangements were found on general and dairy farms, and the most commonly reported types of payment were in the form of wages, a share of crops, and a share in the livestock. Sons were sharing in the management on more than three-fourths of the farms surveyed. Sons generally start as junior partners with their parents, where the sons share in one or two projects on the farm. These junior partnerships develop into senior partnerships, where the sons share in all of the projects.

Partnership arrangements are important in helping sons get started in farming; also in keeping sons on farms.

Some of the essentials to success are: Good farm records; good management plans; adequate size of business; ability of father and son to get along together; provisions for sharing of receipts and expenses equitably; separate housing quarters; and desire of the father to have one of his sons as a partner.

Some of the difficulties encountered are: Intolerance of the father and his unwillingness to give up control; insufficient income to support two families; lack of housing accommodations; lack of interest on the part of the son's wife in farming.

Farm Insurance

About 1,750 farm insurance policies were analyzed for fire insurance coverage on Maryland farm property, and about 2,000 questionnaires were mailed to farm owner-operators in the various counties. One thousand of these contained questions on fire insurance carried on farm property, and 1,000 pertained to life, health, and accident insurance coverage of farmers and the farm family.

About 39% of farm property insurance was placed on dwellings; 29% on barns and other buildings; and 33% on personal property. Average coverage was $2,900 for dwellings; $1,600 for barns; and $800 for other buildings. Nearly all farmers carried fire insurance on the dwellings and barns, and two-thirds of them had similar protection on stored crops, farm equipment, and livestock. On about one-half of the farms surveyed the amount of insurance carried on farm buildings represented from 50% to 75% of current building values, whereas on 22% of the farms less than 50% of current building values were covered.

Two-thirds of the farmers who were questioned carried life insurance on themselves. One-third of them carried this type of insurance on their wives, and/or children. Seventeen percent of the farmers had health insurance; 30% had accident policies; and 35% had some form of hospitalization protection.

Rural Road Improvement and Financing

Lengths of lanes on 7,600 Maryland farm units, condition of lanes on 500 farms, types of rural road facilities in relation to soil productivity classes, and maintenance cost of county roads were investigated. Mileage of county road responsibility of the various counties was compared with taxable resources, public debt, and number of farm units served.

Farm lanes average .13 of a mile per farm, 70% of the farms having lanes of less than one-eighth of a mile. County road responsibility varies among counties from .13 to .35 of a mile per farm. The County taxable basis per mile of county roads varied in 1947 from $36,000 to $310,000.

About 1,100 miles of county roads have been all-weather surfaced in the last ten years. However, 45%, or 5,600 miles of the county road mileage in Maryland in 1947 were without such improvements. Earth roads constitute from 44% to 66% of the road mileage directly serving the better agricultural land areas of five counties in Maryland.

Amounts apportioned to counties from state highway-user taxes are inadequate to pay maintenance costs of, and make rapid improvements in, county road systems. Local property taxes or other local revenue will speed up the improvement program. The public debt status in many counties offers a possibility of using local public credit for speeding up road surfacing.

Marketing of Hatching Eggs and Broilers

Personal interviews were conducted with 22 hatcherymen, 99 broiler producers, and 15 poultry processing plants in Delaware and the Eastern Shore of Maryland in a study of hatching egg and broiler marketing.

It was found that about two-thirds of the eggs hatched in the Del-Mar-Va peninsula were produced in New England, about one fourth locally, and the remainder in Pennsylvania. On the basis of a limited sample, the percentage hatchability of eggs according to source of supply was: Local, 75.8; Pennsylvania, 78.0; and New England, 79.4. More than 98% of the eggs were transported by trucks. About 90% of the chicks hatched were Barred Rock - New Hampshire crossbreed, in spite of the fact that some dressing plants paid a premium price for pure New Hampshire Reds. Violent fluctuations in demand for chicks is an important problem facing hatcherymen.

Marketing Vegetables in Consumer Packages

A detailed study has been made of the harvesting, prepackaging, and marketing of spinach and kale. Data were collected from three pre-packaging firms, one production area, and six city supermarkets.

Results show that harvesting spinach in such a manner that the leaves separate from each other results in a yield of 23.5 pounds of spinach leaves per bushel compared with 18.1 pounds for spinach harvested with roots.

The average yield of spinach at the plants was 2.45 cartons per bushel. Assuming the cost per bushel to be $1.50, ingredient cost per carton was 61.2¢; prepackaging material, 40.7¢; average freight, 19.2¢; labor, 26.5¢; and overhead, 24.5¢; making a total cost of $1.71.

The average yield of kale per bushel was 1.4 cartons. With a per bushel cost of 86¢, ingredient cost was 61.2¢; packaging material, 40.7¢; freight, 17.4¢; labor, 32.0¢ and overhead, 24.5¢; . . . making a total cost of $1.76.

Records of price and quantity relationships in the retail stores show the demand for spinach and kale to be relatively elastic. This method of merchandising has greatly stimulated sales. It has given the homemaker a good quality product, cleaned and sorted, ready to cook and serve.

Grower to Retailer Marketing of Sweet Corn

In this study, cost data on the production, harvesting, and marketing of sweet corn handled by different methods were collected and analyzed.

They show that the premium sweet corn collected was harvested early in the morning and delivered to the retail stores in Baltimore and Washington before 11:00 a. m. Farmers were paid a premium of one cent per ear for the pre-dawn harvested corn.

The first year's study revealed that to successfully merchandise premium sweet corn, the grower should channel his supply through a central handling agency. A thorough job of precooling and refrigeration of the corn helps maintain quality from the farm to the store and to the ultimate consumer.

Farm Tenancy

A field survey has been made of tenant-operated farms, and assorted historical records and monographs were analyzed in a study of farm tenancy.

Results show that lease agreements have undergone considerable change as evidenced by the term of leases. Leases for a period of one year are more prevalent today. Farm tenancy in Maryland has declined from 33.6% in 1900 to 23% in 1945.

Agricultural Engineering

Grain Drying

A small grain dryer has been tested with coils suitable for drying corn. Results indicate that a slightly larger dryer, or one with more coils, is required to get equivalent drying capacity with wheat than with corn.

Corn was dried from 24% to 16% in one pass at a slow rate, indicating that any corn safe in its crib could be dried in one pass. Corn was dried to as low as 10.7%, indicating that corn can be readily dried for safe keeping.

Heated Air Hay Drier

A study has been initiated to determine the possibilities of drying pick-up baled, partially field-cured hay with heated air on a specially built drier. The hay was to be moved to storage after drying.

This year's work was not conclusive, but it did show certain facts. First, hay should be 50% or below in moisture content before baling to reduce the cost of drying. It is preferable to leave hay in the swath until moisture content is 40% to 50%, but not beyond the point where leaves will fall from the plant when the hay is handled.

It was found advantageous to put up bales of even size and density; to get them to the drier as soon as possible after baling; and to bale as loose as possible without losing the shape of the bale.

Trial showed that the hay dried with best results when stacked in three layers. It took from 48 to 72 hours. The cost of operating was the same per hour regardless of the amount of hay on the drier. Small stacks were found to cost more since they required almost the same drying time as full loads.

Although the drying cost was high, the hay was also high in quality. Protein content averaged about 16% for all types of hay, and the carotene content varied from 19.3 PPM to 52.0 PPM depending on the type of hay cured. All hay was excellent in leaf and green color content.

Poultry Processing

The problem of the scalding, picking, and waxing operation came up in the construction of a working model of a poultry dressing plant built for experimental purposes by the Poultry Department. Birds do not dry during normal conveying time between picker and waxer without special attention. Also, wax cleaning does not produce acceptable results unless birds are quite dry.

Birds were exposed to 212° F. and lower air temperatures in a duct. At the high temperature the flesh began to cook in a very short time, but when the temperature was lowered, the time required for drying was greatly increased. Since birds on a line in a dressing plant must move quite rapidly, the length of air duct required is great, and many present dressing plants lack the necessary space.

Tobacco Labor Studies

Studies of labor methods and related equipment used in connection with handling Southern Maryland tobacco were started in 1947 in cooperation with the Emergency Farm Labor Program.

The investigation pointed out that the use of certain tools . . . the stick sharpener, topping and suckering knife, tomahawk cutting knife, and the stick holder . . . can reduce labor, make the work easier, and improve the quality of the work done.

There is also a need for artificial lighting in connection with the stripping and grading of Maryland tobacco. Tests were made on fluorescent and incandescent lights. It was found that a fluorescent light combination of one daylight tube and one 4500 degree white tube gave the nearest to a true "north light." Further work is required to determine their best location, number of units, and quantity of light needed in a stripping room.

"View of the interior of the drying section partially filled with hay recently dried. The main air duct, which opens into the lateral ducts exposed above, is located below the flooring in the center of the dryer. The lateral ducts are on both sides of the main duct. The conveyor is used to transport the baled hay in and out of the dryer."

Agronomy

Field Corn Hybrids

Eighty-three hybrids and two open pollinated varieties were included in one or more of nine replicated regional tests in Maryland. Open pollinated varieties continued to show comparatively poor yield and standability. The most widely used recommended hybrid outyielded the average of all hybrids tested by about 5%, emphasizing the importance of care in the selection of hybrids for farm use.

The fact that over 90% of the Maryland corn acreage is planted to hybrids has promoted greater interest in hybrid versus hybrid rather than hybrid versus open pollinated variety.

Close cooperation with other stations in the Northeast is being emphasized in the Maryland program. In addition to the replicated field tests, one 25-entry experimental double cross test and two 49-entry single cross tests were conducted at College Park in cooperation with the Northeastern Corn Conference.

Sweet Corn Hybrids

In order to find crosses with superior productivity and high kernel quality, 66 hybrids from out-of-state sources and six hybrids involving Maryland inbreds were grown in a replicated yield test at College Park. Of the Maryland crosses, three gave excellent performance, outyielding Golden Cross Bantam and exhibiting plant characteristics and kernel quality equal or superior to this widely used hybrid.

Small Grain Tests

Twenty-three varieties of wheat were compared in replicated drill plots at College Park. Similar plots at Ridgely included ten varieties, and in Frederick, Washington, Carroll, Harford, Cecil, Talbot, and Kent Counties included five varieties. The Thorne variety was the highest yielder at College Park, and also had the highest average yield for the county tests.

On the basis of a three-year average at College Park, seven varieties have had the following yields:

Variety	Avg. Yield
Thorne	34.9
Leap 53 (Md. selection)	34.4
Leapland (Widely used Md. strain)	33.0
Nittany	31.6
Red Heart (Earliest variety tested)	29.7
Fultz (Oldest variety in test)	29.4
Mammoth Red	29.0

For the same period at Ridgely, Leapland led its nearest competitor, Thorne, by 2.3 bushels per acre. On the basis of data collected to date, the two recommended beardless varieties, Thorne and Leapland, are outyielding the two recommended bearded varieties, Nittany and Mammoth Red, at all test locations.

Wong barley has continued to outyield its nearest competitor in the tests at College Park. On the basis of a three-year average, its margin of superiority is 11.5 bushels per acre. At Ridgely, the Kentucky No. 1 and Tennessee Winter varieties have had slightly better yields than Wong.

Fertilizing the Corn Crop

During the past four years, tests have been conducted at College Park to determine the value of commercial fertilizers used in different combinations of plow-under treatments, row applications, and side dressings on field corn. Each year two tests have been run, one on a fairly heavy silt loam soil and the other on a light sandy soil.

Over the test period, the most profitable single treatment has been the application of 200 lbs. of 3-12-6 with the fertilizer attachment on the corn planter at the time of planting. This treatment has given a consistent increase over unfertilized rows of from 5 to 30 bushels per acre.

The plowing under of 150 lbs. of ammonium nitrate, or 700 lbs. of 7-7-7, has generally given some increase in yields, but response has varied with the season and soil fertility. The practice of side dressing the corn crop with 100 lbs. of ammonium nitrate late in July has also given a somewhat varied response. On the heavier, more fertile soils, increases from this practice have been very slight. On the sandy soils which have been deficient in nitrogen, yields have sometimes gone up as much as 30 bushels per acre.

In all of these tests there has been an approximate stand of 10,000 plants per acre. A thicker rate of approximately 15,000 plants per acre gave a lower yield of poorer quality corn at the lower fertility levels. On the highly fertilized plots, it was about equal in yield, but still poorer in quality.

Pasture Renovation

Disking of established Kentucky bluegrass-white clover pasture land in early spring has not killed the bluegrass plants sufficiently to get a good stand of other grasses and legumes such as orchard grass, tall fescue, Ladino clover, and alfalfa. Preparation of the seedbed by plowing in the spring has resulted in good stands of these grasses and legumes.

Permanent pasture sods must be disked heavily in late fall and again in early spring if they are to be killed sufficiently to establish tall growing forage plants.

Short Rotations

For the past seven years, a series of short rotation experiments has been in progress at College Park. Some rotations provide grain only, some silage only, some silage and hay, while others provide silage, hay, grain, and bedding.

The two-year dairy rotations include one year of silage or corn grain and one year of small grain and lespedeza. The feed yields of different crops in these rotations were as follows:

Crop	Feed Yield Per Acre
Corn Silage	15.5 tons
Soy-sorghum Silage	9.7 tons
Corn	69.2 bu.
Wheat	26.7 bu.
Barley	32.4 bu.
Oats (Spring)	35.9 bu.
Lespedeza (in stubble)	4019. lbs.

The bedding value of corn, wheat, barley, and oats must also be taken into consideration. Corn produced 1,000 pounds more of bedding than did any of the other grains, of which wheat produced most, barley next, and oats least.

Animal Husbandry

Feed Levels for Breeding Ewes

In a test of the effect of energy intake on breeding ewes, three groups were fed the same rations, but at energy levels of 70, 90 and 110 percent of the Morrison standards for pregnant and lactating ewes.

In the third winter's trial, the ewes in the 70% lot had a noticeable lack of condition and vigor at the close of the experiment, and their 1948 lambs developed poorly and made small gains. The ewes in the 110% lot finished the trial in good condition and vigor, as reflected in the development and gains of the lambs. The ewes in the 90% lot were intermediate in this respect.

The ewes in the 110% lot produced the most scoured wool per ewe, while the ewes in the 90% lot produced the least.

Swine Breeding Investigations

Foundation stock of a 3/8 Berkshire 5/8 Landrace cross are being selected on the basis of color and type and litter size, nursing qualities, and general vigor.

A more growthy shoat has emerged that is longer and smoother of side, with good depth and fullness of ham. The jowl is very trim and neat, and vigor and thrift of pigs has been good. Selection has been toward the blacker sows and boars, but in order to maintain sufficient numbers many animals spotted in color with white markings have had to be retained. The animals selected have a little stronger arch to top line, have stood up well on feet and legs, and have possessed a trifle smaller ear.

Under farm conditions this strain has produced large, quick maturing litters.

Value of Different Hays in Rations of Pregnant Beef Cows

Three lots of seven purebred Aberdeen-Angus cows were wintered for the third trial on roughage rations of mixed clover-light timothy hay, wheat hay, and barley hay. In addition, all the cows were fed corn silage, and barley was fed as a concentrate to all cows suckling calves. Soybean oil meal and ground limestone were fed to the lots receiving the barley and wheat hays to make up for any deficiency in protein and calcium in these rations. The calves were creep fed ground barley.

During the 1947-48 wintering trial, the cows in the wheat hay lot showed the smallest loss in weight and the cows in the barley hay lot showed the greatest loss in weight. Cows in the barley hay lot showed the most apparent loss in vigor.

The calves in the clover-timothy hay lot made the greatest daily gain, while those in the wheat hay lot made the least daily gain. Vigor in all lots except the barley lot remained good throughout the trial. The calves in the clover-timothy hay lot consumed the most creep feed per calf.

Wintering Rations for Pregnant Beef Cows

Corn silage, when properly supplemented with soybean oil meal and ground limestone, as fed in this experiment, proved to be a very satisfactory roughage for wintering pregnant beef cows.

The dry cows on a corn silage ration finished the experiment in better condition than those on a mixed hay. Those that calved lost less weight during the lactation period than cows that calved in the mixed hay lot. The birth weight of calves in the corn silage lot was higher, and these calves made a greater average daily gain. There was very little difference in the wintering costs of the two rations.

Animal Pathology

Vaccination for Bang's Disease

Tests have shown that the injection of vaccine for Bang's Disease (Bovine Brucellosis) in the skin has been more effective than injection under the skin. At the end of one year, 95 percent of calves injected by the first method were negative, in contrast to 74 percent of those by the second procedure.

Revaccination experiments have been in progress with animals previously injected as calves, making use of reduced amounts of vaccine. The results to date are encouraging in that the blood titers from the repeat injections have shown a tendency to drop rapidly to a low level. This procedure, if it proves satisfactory, can be used in infected herds as an added protection to vaccinated replacements.

Immunization of Chickens Against Newcastle Disease

Vaccines have been produced for immunization against Newcastle disease by modifying the disease virus through passages in Syrian hamsters. The safety of the vaccine under laboratory conditions has been conclusively shown in all trials.

The vaccine sets up a noticeable disease in from one to two percent of the injected birds, but the disease in these individuals has never spread to normal birds in contact with them. Results to date of extensive field trials justify expectations.

Milk Fever and Acetonemia

Studies with milk fever and acetonemia have shown that some of the changes which are considered characteristic of these diseases are also present in normal calving cows. Some of these changes can be produced in normal non-calving cows by administration of alkali (sodium carbonate).

Results of treatment of milk fever with various drugs, including calcium salts, support the opinion of the value of calcium in this disease, and the studies are being continued.

Blackhead of Turkeys

As part of the investigations with Infectious Enterohepatitis (Blackhead) of turkeys, eleven experiments, including invivo tests with three drugs, field tests, and invitro tests with Locke's Alkaline Serum cultures of **Histomonas meleagridis**, were carried on during the past year. Two hundred and eighty-nine poults were employed.

In three inoculation experiments with Vioform (Iodochloroxyquinoline) it was determined that poults receiving 1% of the drug were able to resist artificial inoculation with blackhead to a highly significant degree. The death rate of the medicated group in these tests was only 15.3%, whereas in the control group the death rate was 96.4%.

In a field trial involving 100 poults, loss in the control group amounted to 50%, while in the medicated group the total loss was only 22%.

Control of Fowl Cholera

Experimental fowls receiving 0.5% to 2% sulfathiazole in mash exhibited a significant degree of resistance against artificial exposure to fowl cholera. When administered at the 2% level, however, sulfathiazole proved toxic for laying chickens.

In two naturally infected chicken flocks the drug was administered at the level of 0.5% of the mash. In both flocks the disease had existed for some time previous in a chronic state. Losses stopped in a few days after medication was started and the flocks improved in appearance as well as in egg production. In each flock, however, the disease recurred in a few birds after the drug was stopped.

Fowl cholera has occurred after the period of medication both in experimental and naturally infected chicken flocks.

Resistance to fowl cholera is a variable factor. Some fowls survive a dose 2 to 4 times greater than that fatal to others.

Sulfamerazine and Pullorum

In a study with New Hampshire day-old chicks, it was found that sulfamerazine fed in the diet at a level of 0.5% was effective in preventing mortality in chicks inoculated orally with **Salmonella pullorum.**

At four weeks of age, three out of 30 noninoculated-medicated chicks, and six out of fourteen surviving inoculated - nonmedicated chicks reacted to the tube agglutination test for pullorum.

There was no depression of growth in the noninoculated-medicated chicks at three weeks of age. The average feed consumption per chick was lower in that group, and they utilized feed more efficiently than did the noninoculated-nonmedicated chicks.

Thyroid Activity and Fowl Cholera

The recurrence of fowl cholera after the discontinuance of sulfonamid therapy has shown the need for a form of treatment that will raise the level of general body resistance and possibly ward off further attacks of the disease.

A study along these lines has shown that a hypothyroid condition lowers the body resistance against **Pasteurella avicida** below that of the normal bird, while a hyperthyroid condition tends to raise the ability of the bird to resist the disease. Gain in body weight per bird and the number of cases occurring in each group have been used to measure the progress of the groups against the disease.

Botany

Strawberry Breeding

The strawberry breeding program is now aimed at augmenting the red stele resistant variety, Temple. Several new numbered strains with higher resistance, different fruit characteristics, and other traits not in the variety Temple are being observed. Hybrids between Maryland 683 and previous selections are proving very fruitful in this program.

Pepper Breeding

A strain of peppers from a uniform selection of California Wonder is yielding a high number of twin and multiple seedlings. A similar strain has also been isolated from the variety Goliath. Plans are to use the haploids from these strains, which already number over a hundred, as material for an F_1 hybrid pepper for Maryland conditions.

Seed Treatments

The effect of seed treatments of nitrogen-fixing bacteria in peas and beans is now being studied. It appears that there is a variation in resistance in the strains of **Rhizobium sp.** to the newer organic materials. The tolerance to these strains will determine the dosage to be eventually recommended.

Raspberry Diseases

The mild streak disease of raspberry has been studied over a seven-year period. A natural spread of the disease has been closely observed over six years in a newly planted lot. During this time, both graft and dodder transmission has been successful, definitely indicating the disease is a virus. All attempts at insect transmission, however, were negative, although this appears to be the method of spread in the field.

Dairy

Vitamin A Deficiencies

Research has shown that cows and calves developed a vitamin A deficiency rapidly when they were fed a roughage low in carotene and a grain mixture made up partly of ground raw soybeans. Efforts have been made to determine why the soybeans had this effect, and also the minimum level of carotene necessary in the diet to offset the destructive action.

While the work is not sufficiently complete to warrant final conclusions, it does appear that there is some danger in feeding large amounts of soybeans if cattle are not receiving a good source of carotene such as silage, good hay, or pasture grass.

Tests were also made on the efficiency with which calves utilized the carotene in dehydrated cull sweet potatoes. Indications are that this may be an efficient and economical source of carotene.

Milk Fat

It is becoming more and more evident from the studies on the formation of milk fat that bacterial action in the rumen of the cow plays a very important role. Withholding feed from the cow and feeding excess amounts of cod liver oil cause marked changes in the butterfat—apparently by stopping the formation in the rumen by bacteria of substances needed for the formation of milk fat. A comprehensive study is now in progress to determine how milk fat is made and how it may be altered.

Milk Flavor

One of the changes produced when milk or milk products are heated to high temperatures is the production of a cooked or boiled flavor which has been correlated with the production of reduced sulphur groups and the liberation of hydrogen sulfide gas.

Although the critical temperatures

for these changes in milk have been established, information for ice cream in this regard is limited. Preliminary results have revealed that ice cream exhibits a higher critical temperature than milk. The cooked flavor was found to be dispelled to some extent by freezing, storage for a few days, and the presence of vanilla extract.

These results indicate that perhaps ice cream mix may be processed at higher temperatures than those normally used without affecting the flavor, and at the same time improving the keeping quality.

Ice Cream Quality

A survey conducted in the Baltimore and Washington areas showed that some of the commercial samples of ice cream were excessive in lactic acid. Bacteriologically, the ice cream was generally of excellent quality, although while factory-packed ice cream was consistently low in bacteria count, a few of the hand-packed samples gave excessive values.

Horticulture

Orchard Mineral Deficiencies

With the aid of chemical analyses of leaves of peaches and apples, a more accurate diagnosis of the fertilizer needs of Maryland orchards is being made.

Severe potassium deficiency has appeared recently in Maryland peach orchards. This has been especially true in new plantings on land not previously in orchard. Magnesium deficiency has appeared in apples of non-bearing to early bearing age. In both cases, the diagnosis has been confirmed by leaf analysis.

Remedial measures for potassium deficiency by surface application of muriate potash under the spread of the limbs caused rapid recovery of severely affected trees. It can be expected that early summer applications will bring about almost normal growth of young peach trees before the end of the season.

A survey of mineral levels in peach and apple orchards by means of leaf analysis has shown that most bearing orchards in Maryland have a sufficient amount of the major minerals to keep them out of danger of showing mineral deficiency symptoms.

Thinning and Spacing Temple Strawberries

Records of yield, fruit size, and quality were obtained from plots of treatments which included 12, 18, and 24 inch widths of matted-row plants, 12, 18, and 24 inch widths of thinned-row plants, and a 24 inch width of plants spaced at 9 inches. Each treatment was replicated five times.

While the individual plants increased in size and yield as a result of thinning and spacing, these increases were insufficient to compensate for the reduction in stand. Consequently, when the data were transposed to an acre basis, no significant increases in yield resulted from either thinning or spacing plants of this variety.

These results with the Temple variety indicate that there is not sufficient competition in the matted-row to make adjustment in plant stand a profitable commercial practice with this variety under Maryland conditions.

Nutritive Value of Canned Fruits

Maryland horticulturists have been trying to find a rapid means of determining the caloric value of canned fruits. Work done during the year with canned peaches, pears, apricots, prunes, figs, and fruit cocktail indicated that almost all of the caloric value is in the form of sugars. Furthermore, a measure of the density, or the refractive index of the syrup has proved to be closely correlated with the sugar content of the syrup free fruit. Therefore, a reasonably accurate estimation of the caloric value of canned fruit may be made very quickly by immersion of a Brix hydrometer into the syrup, or by measuring the soluble solids of the syrup in a refractometer, and reference to a conversion table.

Determining Quality by Objective Methods

An instrument was devised for measuring fibrousness of asparagus. It consists of a blunt edge cutting surface and a gauge for measuring the pounds of pressure required to cut through the stalk. It was found that readings of 7-8 pounds are obtained consistently 1/4 inch above the natural snaping point of the stalk. These pressure readings showed close correlation with fiber content and with organoleptic ratings for tenderness.

A rapid method for determining the color of the asparagus was also developed. This consists of extraction of the asparagus pigment with acetone and measurement in a suitable colorimeter. The freshness of asparagus may be measured by a rapid determination of ascorbic acid, since ascorbic acid values are sharply reduced when the material is held in storage.

The tenderness of peas when held in the pod may be measured with a tenderometer or a texturemeter. These instruments were devised for canning peas, and are too bulky to be used in the field or retail outlet. A new instrument which amounts to a miniature tenderometer has been developed that shows considerable promise. A satisfactory method for determining color in peas has also been developed.

Storage tests with sweet corn indicate that the succulometer reflects accurately changes in quality of sweet corn resulting from storage. This is not true if the corn has been exposed to an external source of moisture such as icing or water cooling.

Nutritional Values of Tomato Juice

Tomato juice from eleven varieties of tomatoes was canned and pH, total acidity, percent sugar, and sugar acid ratio were determined on fresh juice and juice stored for various periods. The "Seal of Acceptance" required by the American Medical Association is 20 mg. ascorbic acid per 100 grams of the juice.

The variety Rutgers met this standard under all conditions. All the others were below 20 mg. at some time. Loss during storage in plain tin cans was very slight. Seasonal differences in the same variety were noted.

Studies during the past two years

indicate that even with retention of 90% of the original content of ascorbic acid after canning, most samples fell below the above standard.

Storage of Vine Ripened Tomatoes

Studies have been conducted during the past year to determine the effect of various storage temperatures upon vine ripened tomatoes in an effort to investigate the possibility of handling market tomatoes harvested in more advanced stages of ripeness.

In these tests, ripening or coloring of the tomatoes was measured objectively as the amount of lycopene or the red pigment obtained by extraction and determined by light transmittance in a Beckman spectrophotometer.

Tomatoes stored at 32° and 38°F. showed no increase in color after 14 days of storage. At 45° and 55° ripening was very slow, but at 60° coloring proceeded at a rapid rate. At temperatures of 85° or above, ripening was greatly retarded and tomatoes turned yellow instead of the normal red.

When partially colored tomatoes were stored at low temperatures and later moved into higher temperature storage, ripening of the fruit was delayed in the second storage. This effect increased with the time of holding at the lower temperature.

Prolonged low temperature storage (12 days at 32° or 38°) did not cause any breakdown or chilling injury of the tomatoes. Fully colored tomatoes remained in excellent condition and flavor under these storage conditions. Partially ripe fruit, however, developed off-flavors when ripened after the prolonged low temperature stor age.

Mineral Nutrition of Cantaloupes

The concentration of mineral nutrients most desirable for the growth and fruiting of cantaloupes was studied under controlled culture in the greenhouse. Nitrogen, potassium, calcium, magnesium, and boron were represented in the treatments at three levels of each.

The results revealed that a relatively high concentration of nitrogen produced the best growth, but the best set of fruit occurs at a comparatively low nitrogen level. Both growth and fruiting were greatest when the levels of potassium and calcium were fairly high throughout the growth cycle. A moderate level of magnesium was necessary for the best early growth of the plants, but later growth was not influenced by magnesium level provided the concentration was above the deficiency range. Boron concentration had little effect on growth, but the greatest soluble solids content of fruit was found when the boron content was high.

The interactions of the elements were significant only when one or more of the elements was in the deficiency or excessive range of concentration.

Rate of Seeding Peas

Alaska and Superlaska peas were planted at rates of three, four, and five bushels per acre. Four replications were included for each treatment. The yield of shelled peas increased significantly with each increase in rate of seeding.

Hormones Increase Set of Snap Beans

In a preliminary test, two hormones — alpha-ortho-chlorophenoxyproprionic acid (ClPP) and parachlorophenoxyacetic acid (ClPA) — were mixed with rotenone and dusted on snap beans five days after blossoming started on one acre plots. In comparison with dusting the beans with rotenone only, the hormone treatments resulted in average increases of 7% and 17%, respectively, where weather conditions were very poor for pod set.

Relation of Fungicides to Cantaloupe Quality

Cantaloupes which were sprayed with five different fungicides were tested for soluble solids content. In all cases, the soluble solids content was higher where fungicides were applied than in the check plots. Analysis of the leaves of plants from each treatment revealed that there was no relationship between either the calcium or magnesium content of the leaves and fruit quality. The potassium content of the leaves, however, decreased as the soluble solids content in the fruit increased, indicating that some of the potassium may be accompanying the sugars being translocated to the fruits.

Sweet Corn Cut-off Records

Records were again obtained on the most promising new varieties and selections grown in cooperation with the Agronomy Department. These varieties included: Golden Cross Bantam, Seneca Chief, Maryland Cross 833-7 x P51-22, Maryland Cross Seneca Chief x 833-4, Tendermost, Country Gentleman Ill. 15, Country Gentleman Ill. 14, Country Gentleman Ill. 13, Country Gentleman R5, Country Gentleman R14, Country Gentleman C5, and Country Gentleman C14.

Complete data on yields per acre, percent of husk, trimming loss, percent of kernels to total weight, days from planting to harvest, succulometer readings on raw and canned corn, moisture determinations at time of harvesting, and alcohol insoluble solids determinations were made available to corn processors in mimeographed form.

Vegetable Crop and Variety Testing

A total of 232 varieties, representing forty-eight different kinds of vegetables were grown in the summer of 1947 to determine their adaptability to Maryland conditions. Pertinent data, which were obtained relative to growth and yield, furnish a basis for recommendations to commercial growers and home gardeners.

In addition, twenty varieties of white potatoes were canned and subsequently graded by 18 commercial canners of this product with evaluation for texture and wholeness. The five varieties scoring highest in these qualities were Chippewa, Warba, Irish Cobbler, Mohawk, and Norkota.

Insect Control

Concentrated Sprays

During the 1947 season considerable attention was given to the control of the Mexican bean beetle with liquefied gas aerosols. Equipment was developed for applying this type aerosol while cultivating the bean crop. This dispenser, which has been called a cultisoler, consists of a hood enclosing the spray nozzles, and is attached either to the cultivators or the tractor carrying the cultivators.

Rotenone and pyrethrum aerosols were formulated which functioned satisfactorily in the dispenser and extensive tests were carried out on approximately 500 acres of snap and lima beans.

Satisfactory bean beetle control was secured where treatments were applied early before plants were severely injured and while they were not yet too large to be easily covered by the spray. The cost of treatments varied from $4.00 to $6.00 per acre, depending on the dosage and concentration of the spray. This method of insecticide application for bean beetle control holds considerable promise and will be investigated further.

Control of the Codling Moth

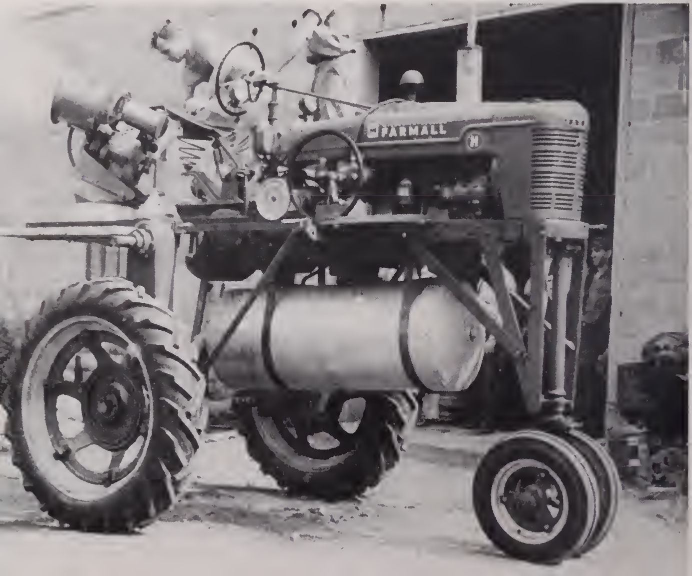
Successful control of the codling moth was obtained with DDT sprays. Four applications of DDT spray, 1 pound of DDT to 100 gallons, at 15-day intervals; or two applications of spray containing 2 pounds of DDT per 100 gallons at 35-day intervals gave 98 percent protection of apple fruit from codling moth larvae.

Control of Peach Insects

Hexachlorobenzene was found to be superior to DDT, lead arsenate, and several other insecticides for control of the plum curculio and caused no injury to foliage or woody portions of peach trees. The addition of DDT to early sprays was found to be beneficial for control of the oriental fruit moth.

Extensive tests show that the stickers and spreaders do not enhance the value of DDT sprays for peach tree borer. Good commercial control was obtained with one application of spray, 3 pounds of DDT to 100 gallons of water. DDT emulsions were equally effective when the same amount of DDT was applied.

This experimental high clearance tractor was developed by the Department of Entomology to spray for the control of the Japanese beetle and European corn borer. The assembly has been used in spraying from 80 to 100 acres of corn a day.



Poultry

Fertility and Hatchability Studies

Studies have been made seeking more information of a fundamental nature concerning the physiology of fertility and hatchability. Three groups of hens were fed, respectively, the Maryland Experiment Station ration, the same ration plus 0.3 percent thiouracil, and the same ration plus 10 grams of thyroprotein per 100 pounds of feed. Thus, three levels of thyroidal activity were produced.

Fertility was lower in each of the two groups of treated birds, but hatchability was not affected. However, the incubation period of the eggs laid by the thiouracil-fed group and the thyroprotein-fed group was over 12 and 26 hours longer, respectively, than that of the eggs laid by the untreated birds. The results secured lead to a better understanding of the physiology of reproduction and may enable flock replacement costs to be reduced.

Effects of Feeding Thyroprotein and Thiouracil

A fast-growing and a slow-growing strain of New Hampshires and of Barred Plymouth Rocks were reared simultaneously under uniform conditions. The males of each of the four strains were used to determine the effects of adding thyroprotein to the diet on rate of growth and feathering as compared with untreated males in each strain. The females of each of the four strains were used to determine the thyroidal activity of each strain.

Feeding thyroprotein had a relatively greater growth-stimulating effect in the slow-growing strain of each breed than in the fast-growing strain. The activity of the thyroid gland in the fast-growing strain of each breed appeared to be somewhat higher than that of the slow-growing strain. The results secured indicate beneficial effects from feeding thyroprotein to slow-growing strains of market birds.

In additional tests, comparable groups of 8 to 10 week old cockerels were selected on the basis of their previous two-week gains. Some groups were fattened on the Maryland Experiment Station mash, other groups were fed the Station mash plus 0.2 percent of thiouracil, and other groups were fed the Station mash plus 0.2 percent thiouracil and 1 to 7 grams of thyroprotein per 100 pounds of mash.

Adding thiouracil to the mash resulted in a decreased rate of gain whereas adding thiouracil and from 1 to 3 grams of thyroprotein produced rates of gain equaling or surpassing that of the birds fed the Station mash. Adding thiouracil improved market grade, whereas adding thiouracil and thyroprotein produced a slightly lower grade, but superior to the grade of the birds fed the Station mash. These results may lead to the adoption of more efficient fattening methods on commercial fattening stations and on the farm.

New Strain of Turkeys

Results of the turkey breeding work to date indicate that body conformation and hatchability are inherited. The close inbreeding practices this year had a depressing effect on hatchability in all pens.

Turkey breeders have been provided with data indicating definitely that it is possible for them to improve their strains of turkeys with respect to breast fleshing and grade by adopting a sound basis of progeny testing. In like manner, it should be possible for them to improve hatchability. If put into practice, improved selection methods should result in about $200,000 of increased returns annually.

Pullet Disease of Chickens

Typical and moderately severe outbreaks of Pullet Disease from 3 pens of New Hampshire pullets were secured, each pen being fed a sample of local wheat as scratch grain. No Pullet Disease appeared in the control pen fed corn. One of the lots of wheat, more pronounced in its effect than the others, produced Pullet Disease, though without mortality when fed to a duplicate pen at a later date.

A test of the theory of Van Ness was made, using 20 pounds of $CaCo_3$ and 20 pounds of $NaHCO_3$ added per ton of feed. This treatment resulted in a consistent and significant improvement in egg production in all of the 9 weeks of the test except during the first week. There was no mortality from Pullet Disease in either the pen fed additional calcium and sodium, or in the control pen.

While no data are available, should the control measures prove effective in the field, a saving of at least $50,000 per annum to Maryland farmers is anticipated.

Thiouracil Treatment and Feather Pigment

Treatment of Hybrid fowl with thiouracil has shown that the phenotypic expression of alternative genic potencies may be altered by the drug. Long-time feeding tests bring evidence that separate plumage tracts are affected in a distinct chronological order, suggesting a very gradual depression of the metabolic level of the bird. The first modifications are seen in the hackle and saddle tracts and in the lesser and greater sickles; then in the thigh; next in the breast; and last in the coverts of the flight feathers. To date, pigment modifications in the primaries, secondaries, and main tail feathers have not been obtained. This is of interest since these feather regions are also apparently unchanged in thyroidectomized fowl.

Determining Feather Genotype Through Hormones

The feather growth of Sebright Bantam cocks of different genotype was examined. Hen-feathering, standard to the breed, is developed when the cock is homozygous for gene H. Cock-feathering occurs when the male is homozygous for the recessive allele h. In normal cock-feathered breeds, the male differs in the growth properties of its feathers from the female, which suggested an examination of feather growth in the cock— and henny Bantam. Measurements taken in the breast and saddle of such birds showed that the cock-feathered Sebright behaves as does the male of the normal cock-feathered breeds, and that the hen-feathered Sebright behaves like the female. It is possible, therefore, that gene H exerts its effects through modification of the growth-rates in the plumage.

Feed Efficiency in Egg Production

Current high feed prices mean that the cost of feed represents about 60 percent of the total cost of producing eggs. This study of the main factors affecting efficiency was undertaken in order that definite suggestions could be given to farmers and commercial egg producers.

Of the total feed consumed during the period, 71 percent was used for maintenance, 2 percent for change in body weight, and 27 percent for egg production. Average total annual feed consumption of the birds weighing on an average 5 pounds was 122 pounds. Feed required for maintenance was 80 pounds. Feed required for producing a dozen standard-weight eggs was 1.47 pounds over and above that used for maintenance and change in body weight. For each pound variation in average annual body weight, a difference of 13.6 pounds of feed for maintenance would be required annually. A highly significant correlation was found between efficiency, as measured by feed consumed per pound or per dozen eggs, and level of egg production in the case of dams and daughters.

Vitamin Studies

Research conducted to determine the pantothenic acid requirements of growing chickens revealed the fact that one or more pantothenic acid sparing factors is contained in liver, and possibly in other feedstuffs. Optimum growth was obtained on a synthetic ration supplemented with some of the more potent liver fractions. A standard growth curve for pantothenic acid was developed for New Hampshire chickens.

It was observed that growth rate in chickens was decreased when they were fed a diet deficient in the vitamin, pyridoxine, but containing 4 percent of the amino acid glycine. This is but one step in studies carried on to determine what factors are necessary in order to secure maximum growth in chickens fed diets in which protein is furnished by a combination of various amino acids.

Cellulose added to a synthetic ration as a substitute for glucose at the 5 through 15 percent levels resulted in increased growth. Results secured indicate the possible use of cellulose and mixed pine sawdust to increase the level of bacterial synthesis of the B vitamins.

New Vitamin Curbs Pernicious Anemia

A hitherto unknown vitamin, apparently the principle in liver which is essential in the treatment of pernicious anemia, was isolated. The new vitamin was obtained in the form of crystals, and is 10,000 times as potent in stimulating the production of red blood cells and hemoglobin as the same amounts of the concentrated liver extracts previously used in the treatment of pernicious anemia.

Pernicious anemia is a disease of the blood that affects about 50,000 people in the United States annually, and hundreds of thousands in other countries. Red blood cells are greatly reduced in number, resulting in a serious impairment in the functional efficiency of the blood, thus producing weakness, fatigue, and degeneration of the nervous system.

As a result of the isolation of this new vitamin, tentatively identified as B-12, physicians may administer known doses so that the exact and reproducible therapy will be insured.

Methods of Holding Dressed Chickens

Chickens—fresh killed, chilled and held, or frozen—when completely surrounded by ice, will maintain a fresh-killed appearance for a period of 14 days. However, "off-condition" odors may develop earlier. Eviscerated chickens can be held without spoilage for a period of five days. Eviscerated chickens develop "off-condition" odors sooner than blood and feather-dressed chickens held under the same conditions.

Dressed chickens, completely surrounded by ice, will gain weight, while the same type of chickens, held at the same temperatures and not in contact with ice, will lose weight. The amount of weight change is approximately 0.5 percent per day for blood and feather-dressed chickens, and 1.0 percent per day for eviscerated chickens. The blackened condition that develops in the bones of frozen chickens is correlated with the age of the bird. The younger the bird, the darker will be the color.

Farm Egg Cooling Systems

Eleven methods of holding eggs on the farm prior to their being marketed have been tested. The results of the various cooler trials and experiments indicate that Maryland poultrymen must have artificial refrigeration if they wish to maintain their eggs at premium quality levels during the warm months. This virtually limits quality egg production to the poultrymen who have electricity. Tests with electrically refrigerated boxes indicate that refrigeration cost is far below the premium received for high quality eggs. It is, therefore, profitable for Maryland poultrymen to refrigerate their eggs.

Bleeding and Dressing Chickens

Bleeding has been studied in relation to killing birds for market purposes. The amount of blood in the kidney, as measured by spectrophotometric measurement of the hemoglobin present, has been found indicative of the amount of blood remaining in the body of the chicken. The difference determined in this manner coincides with gross observations of the blood remaining in the body as judged by the fullness of the blood vessels of the wings and visceral vessels. Thus, there is an objective measure of the amount of blood remaining in the body after bleeding.

Starving time has also been studied. It was found that the greatest loss in weight from starving occurs during the first two hours. After three hours, the loss is very slow. The conventional recommendation of 24-hour starving is apparently quite uneconomical.

Publications

BULLETINS

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A44	Forest Taxation in Maryland.	W. P. Walker S. H. DeVault
A45	Farm Real Estate Trends in Maryland.	L. B. Bohannon S. H. DeVault
A46	Labor Utilization in Dairy Buildings.	H. D. Smith A. B. Hamilton S. H. DeVault
A47	Effect of Variety, Maturity and Canning Procedures on Quality and Nutritive Value of Canned Lima Beans.	Amihud Kramer H. R. Smith

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Number	Title	Author
A168	Nitrogen, Potassium and Calcium in Relation to Fusarium Wilt of Muskmelon. **Phytopathology.**	D. L. Stoddard
A169	A preliminary Investigation on the Use of Semi-Solid Vegetable Wastes in Poultry Rations. **Poultry Science.**	R. J. Lillie G. M. Briggs
A170	Efficiency of Feed Utilization in New Hampshires to Ten Weeks. **Poultry Science.**	M. G. McCartney M. A. Jull
A171	The Effect of Certain Holding Conditions on the Quality of Dressed Poultry. **Poultry Science.**	G. W. Newell G. W. Gwin M. A. Jull
A172	Criteria and Genetic Variation of Live Body Conformation in Turkeys. **Poultry Science.**	H. M. El-Ibiary M. A. Jull

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A173	A Study of the Inheritance of Feed Utilization Efficiency in the Growing Domestic Fowl. **Poultry Science.**	C. W. Hess M. A. Jull
A174	Milk Lipase System. I. Chemical Analysis of Fat, Washed Fat, and the Alcohol Soluble Fraction of Fat Obtained from Homogenized Raw Milk. **Journal of Dairy Science.**	I. A. Gould
A175	Hatchability of Chicken and Turkey Eggs Held in Freezing Temperatures. **Poultry Science.**	M. A. Jull M. G. McCartney H. M. El-Ibiary
A176	Effect of Alternating Conditions of Boron Nutrition Upon Growth and Boron Content of Grape Vines in Sand Culture. **Plant Physiology.**	L. E. Scott A. L. Schrader
A177	Field Studies on Spread of the Mild Streak Disease of Black Raspberries. **Phytopathology.**	W. F. Jeffers M. W. Woods
A178	Measurements of the Water-Stability of Soil Structure. **Soil Science.**	J. C. Bryant T. W. Bendixen C. S. Slater
A179	A Basis for Classifying Soil Permeabilities. **Agricultural Research.**	T. W. Bendixen M. F. Hershberger C. S. Slater
A180	The Action of Thiouracil Upon the Spurs of the Domestic Fowl. **Endocrinology.**	Mary Juhn
A181	Utilizing the True Lactic Acid Content to Indicate the Quality of Ice Cream. **Proceedings of the Forty-Third Annual Convention of the International Association of Ice Cream Manufacturers.**	I. A. Gould F. E. Potter
A182	Sawdust in Purified Chick Rations. **Poultry Science.**	Frank Davis G. M. Briggs
A183	High Temperature Heat Treatment of Milk. **Proceedings of the Milk Industry Foundation.**	I. A. Gould
A184	Experiments with Liquefied Gas Aerosols for Control of Bean Beetles. **Journal of Economic Entomology.**	L. P. Ditman E. N. Cory
A185	Earthworm Micro-Biology and the Formation of Water-Stable Soil Aggregates. **Soil Science Society of America Proceedings—Volume 12.**	R. C. Dawson
A186	Relation of Fall Protection to Earthworm Populations and Soil Physical Conditions. **Soil Science Society of America Proceedings Volume 12.**	C. S. Slater

Number	Title	Author
A187	Further Studies in Abnormal Blackening of Feathers of Vitamin D Deficient Chicks. **Poultry Science.**	E. W. Glazener G. M. Briggs
A188	Factors Associated with Skin-Cracking of York Imperial Apples. **Proceedings of the American Society for Horticultural Science.**	V. Shutak A. L. Schrader
A189	A New Virus Disease of Blackberry. **Phytopathology.**	N. L. Horn
A190	Carotene Requirements for Guernsey and Jersey Calves. **Journal of Dairy Science.**	L. A. Moore J. F. Sykes W. C. Jacobson H. G. Wiseman
A191	Ripeness and Color Studies with Raw and Canned Peaches. **Proceedings of the American Society for Horticultural Science.**	Amihud Kramer I. C. Haut
A192	A Rapid Objective Method for Measuring the Color of Raw and Canned Tomatoes. **Proceedings of the American Society for Horticultural Science.**	Amihud Kramer R. B. Guyer
A193	Replacement of Pantothenic Acid by Panthenol in Chick Diets. **Journal of Biological Chemistry.**	J. L. Milligan G. M. Briggs
A194	Effect of Vitamin Deficiencies in New Hampshire Chicks Injected with High Doses of Thyroxine. **Endocrinology.**	M. E. Haque R. J. Lillie C. S. Shaffner G. M. Briggs
A195	The Inefficacy of Ethylene Chlorobromide as a Therapeutic Agent in the Treatment of Gardenias Infected with the Root-Knot Nematode. **Phytopathology.**	A. C. Tarjan
A196	Some Correlations Between Nutritive Values and Objective Evaluations of Quality for Certain Canned Foods. **Food Packer.**	Amihud Kramer
A197	Cases of Scab on Violet and Pansy in Maryland. **Phytopathology.**	R. A. Jehle Anne E. Jenkins
A198	Activity of Vitamin B_{12} for the Growth of **LACTOBACILLUS LACTIS. Science.**	Mary S. Shorb
A199	Nuclear Inclusions Produced by a Strain of Tobacco Mosaic Virus. **Phytopathology.**	M. W. Woods R. V. Eck
A200	A Biologically Annotated List of the Buprestidae of the Lower Rio Grande Valley, Texas. **Annals of the Entomological Society of America.**	G. B. Vogt

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A201	Amino Acid Imbalance of Zein: Its Relation to Nicotinic Acid Deficiency in the Chick. **Proceedings of the Society of Experimental Biology and Medicine.**	A. C. Groschke J. O. Anderson G. M. Briggs

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57	Atmospheric Conditions in Consumer Packages of Vegetables. **Pre-Pack-Age.**	L. E. Scott Salah Tewfik
58	The Prevention of Darkening of Injured Kernels of Consumer Packaged Sweet Corn. **Food Industries.**	H. G. Gauch L. E. Scott
59	Inbreeding in Gladiolus. **Maine Gladiolus Society Year Book.**	D. T. Morgan, Jr.
60	Sweet Corn Field Trials in 1947. **Mimeographed Circular.**	R. G. Rothgeb
61	Compressed Gas Aerosols and Control of the Bean Beetle. **Proceedings of the Peninsula Horticultural Society.**	L. P. Ditman
62	Performance of Hybrid Corn in 1947. **Planographed Circular.**	R. G. Rothgeb
63	Make the Most of Your Tenderometer. **Food Packer.**	Amihud Kramer
64	Relation of Yield to Quality in the Production of Vegetables for Canning. **Proceedings of the Peninsula Horticultural Society.**	Amihud Kramer
65	The Relation of Fungicides to Quality in Cantaloupes. **Proceedings of the Peninsula Horticultural Society.**	F. C. Stark, Jr. C. E. Cox
66	Investigations with "Hormone" Materials for Snap Beans in Maryland. **Proceedings of the Peninsula Horticultural Society.**	F. C. Stark, Jr.
67	Chemical Treatments for Control of Sweet Potato Diseases. **Proceedings of the Peninsula Horticultural Society.**	W. F. Jeffers C. E. Cox
68	Effect of Fungicidal Sprays on Control of Downy Mildew and Yield of Cantaloupes in Maryland in 1947. **Proceedings of the Peninsula Horticultural Society.**	C. E. Cox
69	Agricultural Aerosols and Their Application. **Association of Insecticide Manufacturers News.**	L. P. Ditman E. N. Cory

Number	Title	Author
70	Diagnosing the Fertilizer Needs for Fruit Plantings. **Proceedings of the Peninsula Horticultural Society.**	A. L. Schrader
71	Marketing Hatching Eggs and Broiler Chicks in Delaware and the Eastern Shore of Maryland. **Mimeographed Circular.**	H. D. Smith P. R. Poffenberger S. H. DeVault
72	Two New Nematode Diseases of the African Violet. **Plant Disease Reporter.**	A. C. Tarjan C. E. Cox

Changes in Personnel

Appointments:

J. B. Anderson, Graduate Assistant, Animal Husbandry, September 2, 1947.
R. D. Boyce, Instructor Agronomy, August 15, 1947.
J. E. Foster, Prof. and Head, Animal Husbandry, August 1, 1947.
R. B. Guyer, Res. Asst., Horticulture, March 1, 1948.
J. H. Hall, Graduate Assistant, Agricultural Economics, July 1, 1947.
R. W. Hoecker, Professor, Agricultural Economics, September 15, 1947.
M. H. Kerr, Assoc. Prof., Animal Husbandry, October 1, 1947.
Amihud Kramer, Res. Asst., Horticulture, April 1, 1948.
J. D. Leiby, Res. Asst., Horticulture, September 1, 1947.
E. E. Miller, Res. Asst., Agricultural Economics, February 9, 1948.
R. E. Moreng, Graduate Assistant, Poultry Husbandry, November 1, 1947.
D. T. Morgan, Asst. Prof., Botany, September 15, 1947.
V. P. Saarinen, Res. Assoc., Dairy Husbandry, February 1, 1948.
C. S. Shaffner, Assoc. Prof., Poultry Husbandry, October 1, 1947.
S. C. Shull, Assoc. Prof., Agricultural Economics, September 1, 1947.
H. D. Smith, Res. Asst., Agricultural Economics, September 15, 1947.

Resignations:

G. M. Briggs, Professor, Poultry Husbandry, November 16, 1947.
W. E. Crow, Instructor, Animal Husbandry, July 1, 1948.
C. T. Dellea, Instructor, Dairy Husbandry, January 1, 1948.
R. J. Lillie, Graduate Assistant, Poultry Husbandry, October 20, 1947.
M. W. Woods, Assoc. Prof., Botany, October 10, 1947.

Current Projects

AGRICULTURAL ECONOMICS

A-18	ORGANIZATION, OPERATION AND BUSINESS ANALYSIS OF MARYLAND FARMS.
A-18-w	Trends in Farm Mortgage Financing in Maryland.
A-18-x	Father-Son Partnership Arrangements in Maryland.
A-18-y	The Economic and Social Status of Rural Negro Families in Maryland.
A-18-aa	Insurance Coverage Carried by Farmers.
A-18-ab	Economics of Soil Conservation in the Harford County Soil Conservation District of Maryland.
A-19	THE FARM TAX PROBLEM IN MARYLAND
A-19-h	Status and Improvement Needs of Rural Roads in Maryland.
A-19-i	Improving Farm Building Assessments for Tax Purposes.
A-19-j	Sales Taxes and Their Application to Farmers.
A-26-l	Prices Paid by Farmers for Commodities Bought.
A-26-n	Problems in Marketing in the Postwar Period.
A-26-o	Marketing of Hatching Eggs and Broilers on the Delmarva Peninsula.
A-26-p	Economic Aspects of Marketing Fresh Fruits and Vegetables in Consumer Packages.
A-26-q	Marketing Premium Sweet Corn Direct from Grower to Retailer.
A-32	AN ECONOMIC STUDY OF LAND UTILIZATION IN MARYLAND.
A-32-f	Farm Tenancy and Leasing Arrangements in Maryland.

AGRICULTURAL ENGINEERING

H-46	Concentrated Sprays. (In cooperation with Entomology)
R-6	Investigations of Grain Storage on the Farm.

R-9	Sweet Potato Curing and Storing.
R-10	Drying Hay with Heated Air.

AGRONOMY

B-39	Wheat—Hybridization and Selection.
B-41	Barley—Hybridization for Smooth Awns.
B-42	Hay, Forage and Pasture Crops.
B-43	Soybean Production in Maryland.
B-44	Sweet Corn—Seed Production and Breeding.
B-49	Improvement of Pastures in the Several Soil Provinces of Maryland.
B-50	Development of Dent Corn Hybrids Specifically Adapted to the Corn-Growing Areas of Maryland.
B-52	Effects of Different Short Rotations on Physical, Chemical and Pathological Conditions in the Soil and on Crop Production.
B-53	Curing of Maryland Tobacco.
B-54	Date of Seeding Certain Legumes in Maryland.
B-55	Study of Inheritance of Oil Producing Capacity in American Wormseed.
O-27	Field Studies of the Fertility Requirements and Management of Important Soil Types in Maryland.
O-28-b	A Study of the Formula and Analysis for Late Potatoes.
O-33	Efficiency of Soil Fertility Management.
O-43	Hydrologic Studies with Reference to Soil Moisture Conservation, Soil Fertility and Flood Control.
O-44	A BIOCHEMICAL-BIOLOGICAL STUDY OF MEANS TO INCREASE THE ORGANIC COLLOIDAL COMPLEX OF THE SOIL.
O-44-a	A Study of the Chemical and Physical Changes Produced in a Soil by the Formation of the Organic Colloidal Complex.
O-45-a	Soil Fertility Studies at the University Farms.
O-45-b	A Study of the Availability of Phosphate Material.
O-47	The Available Supplies and Relative Agricultural Values of By-Product Liming Materials of Eastern Maryland.
O-47-a	A Study of the Lime Needs and Reactions in Maryland Soils.
O-47-b	A Study of Neutralization Value of Slag for Maryland Soils.
O-48	A Study of the Reclassification of Soils and the Adaptation of these Classifications to Soil Conservation Work in Maryland.
O-49	A Study of the Effect of Fertilizer, Boron, Minor Elements on the Stand, Yield and Composition of Alfalfa.

AGRONOMY—SEED INSPECTION

N-7	Inspection of Seeds Sold Throughout the State.
N-8	Examination of Samples from Seeds Sold Throughout the State.
N-9	Examination of Samples Submitted to the Laboratory.

ANIMAL HUSBANDRY

C-6	Study of the Factors Which Influence the Production of Cured Pork Products of Desirable Quality and Palatability.
C-8	Swine Breeding Investigations Within the State of Maryland.
C-12	The Influence of Energy Intake on the Performance of Breeding Ewes.
C-13	The Relative Value of Barley and Wheat Hays Compared to Mixed Clover-Light Timothy Hay in the Winter Rations, etc.

ANIMAL PATHOLOGY

D-46	Bang's Disease—Calfhood Vaccination.
D-48	The Formulation of a Control Program Against Fowl Cholera.
D-49	Diagnostic Tests Including Hematology in Swine Brucellosis and Capsule Formation in Brucella.
D-50	Anaplasmosis of Cattle.
D-51	Experiments with Infectious Enterohepatitis (Blackhead) of Turkeys.
D-52	Field Trials in Immunization Against Newcastle Disease with Inactivated and Modified Virus Vaccines.
D-53	Role of Disturbances in the Acid-Base Balance in the Parturient Cow and their Significance in the Cause of Milk Fever and Ketosis (Acetonemia).
D-54	A Study of Infectious Bovine Mastitis; its Control and Eradication and the Economic Losses Attending.

BOTANY

F-9	Cytogenetic Studies in the Genera Ipomoea, Gladiolus and Tulipa.
F-11	The Occurrence and Use of Haploid Plants Resulting from Twin Seedlings of Pepper, Cantaloupe and Other Vegetable Plants of Importance to Maryland Growers.
F-12	The Native Plants of Maryland, Their Occurrence, Distribution and Economic Importance.
F-14	THE CAUSES OF FAILURE DURING SEED FORMATION AS A RESULT OF INBREEDING AND HYBRIDIZATION IN STUDIES OF SOME MARYLAND CROP PLANTS.
F-14-a	Failure of Seed Formation in Reciprocal Crosses Between Double Haploid Peppers.
F-14-B	Some Sterility Problems in Strawberry Varieties Used in a Red Stele Resistance Breeding Program.
J-72	Potato Improvement and Disease Control
J-78	DISEASES OF FRUIT CROPS.
J-78-a	Breeding Strawberries for Resistance to the Red Stele Disease Causes by Phytophthora fragariae Hickman.
J-80-a	Disease Resistance in Potatoes with Special Reference to Wilt and Late Blight.
J-85	The Effect of Hormone and Chemical Treatments on Breaking the Rest Period of Seed Potatoes

J-86	Control of Stem Rot of Sweet Potato by Sprout Treatment.
J-87	Treatments for Control of Seed and Soil-Borne Diseases of Vegetable Crops.
J-88	Development of Identification and Control Procedures for Plant Virus Diseases in Maryland.
K-7	Physiological and Biochemical Aspects of Vegetable Storage.

DAIRY HUSBANDRY

G-11	Growth Data of Dairy Animals from Birth to Freshening Age.
G-27-a	The Effect of Certain Feed Stuffs Upon the Vitamin A Requirements of Dairy Cattle.
G-30	Reproductive Efficiency in Dairy Cattle.
G-34	Chemical Changes in Milk Fat as Related to the Flavor of the Milk.
G-35	The Analysis of Dairy Products
G-37	THE FEEDING AND MANAGEMENT OF THE COW DURING THE DRY AND FRESHENING PERIOD.
G-37-a	Metabolic Studies on Cows with Ketosis.
G-37-b	Pathological Studies of Cows with Ketosis.
G-38	The Fat Metabolism of the Mamary Gland.
G-39	Factors that Affect the Availability of Nutrients in Feeds and Their Influence Upon Blood Composition and Milk Secretion.
G-40	The Influence of High Temperature Heat Treatment on Certain Physical and Chemical Properties of Milk.
G-41	Effect of Feeding High Energy Diets During the Freshening Period.

ENTOMOLOGY

H-29	INVESTIGATIONS OF THE BIOLOGY AND CONTROL OF INSECTS AFFECTING CANNING CROPS. Sub. 6. The Pea Aphid Insecticidal Control and Timing Treatments.
H-35	Nursery Insects.
H-40	BIOLOGY AND CONTROL OF TOBACCO INSECTS. Sub. 1. The Tobacco Horn Worms.
H-41	Biology and Control of the Japanese Beetle.
H-43	The Biology and Control of the European Corn Borer Under Maryland Conditions.
H-46	Concentrated Sprays.
H-48	The Coddling Moth.
H-50	The Biology and Control of the Pests of Commercial Floriculture.
H-51	The Effect of DDT on Aquatic Life.
H-52	The Effect of Various Formulations of DDT on Plant and Animal Development.
H-54	A monographic Study of the Coccid Family Aclerdidae (order Homoptera).

H-55-a	The Control of Insects Attacking Peach Foliage and Fruit.
H-55-b	Control of the Peach Tree Borer.
H-56	Patuxent Project on the Effect of Soil Conservation Upon Insect Populations.

HORTICULTURE

L-68	Factors Affecting Maturity, Shipping and Storage Quality of Fruits.
L-72	Relation of Soil Moisture, Age of Plants, Size of Plants, Spacing of Plants and Use of Mineral Nutrients to Flower Differentiation, Fruit Yield and Quality of the Strawberry.
L-73	Adaptation of Fruit Varieties and New Seedlings to Maryland.
L-74	Environmental Factors and Cultural Practices in Relation to the Growth and Fruiting Responses of Fruits.
Q-58	FACTORS INFLUENCING YIELD AND QUALITY IN THE PRODUCTION AND PROCESSING OF VEGETABLES.
Q-58-a	The Influence of Fertilizer Placements and Analyses on the Yield and Quality of Vegetables Grown for Processing.
Q-58-b	Grading Raw Products.
Q-58-d	Factors Influencing Yield and Quality in the Production and Processing of Vegetables.
Q-58-f	Methods of Determining and Preserving Quality Including Nutritional Values, Palatability and Attractiveness in Fresh and Processed Vegetables and Avoiding Wastage During the Various Marketing Processes.
Q-67	The Value of Organic Matter in the Production of Vegetable Crops.
Q-74	A Study of Regional Adaptation of Certain Vegetable Crops and Varieties in Maryland.
Q-75	The Effect of Certain Factors on the Growth of Tomato Plants and the Quality of the Fruit.
Q-76-a	Breeding New Strains of Vegetable Crops.
Q-76-c	Breeding and Selection of a Fruitful Type of Lima Bean for Maryland.
Q-77	Crop Management Studies with Vegetable Crops.
Q-79	BASIC PHYSIOLOGICAL NUTRITION OF HORTICULTURAL PLANTS IN RELATION TO PLANT BEHAVIOR, FRUITFULNESS, ETC.
Q-79-a	Cation-Boron Relationships in Sweet Potato Nutrition.
Q-79-b	The Mineral Levels and Interrelationships of Mineral Nutrients in Fruit Plantings of Maryland.
Q-80	Basic Physiological Studies on the Quality of Fresh Vegetables as Modified by Various Factors During Harvesting, Preparation for Market and Storage.

POULTRY

M-32	PHYSIOLOGY OF REPRODUCTION OF POULTRY.
M-32-h	Hatchability Studies in Poultry.
M-32-j	The Effect of Hypo and Hyperthyroidism Upon Hatchability in Domestic Fowl.
M-32-k	Differences in Thyroid Activity as Related to Strain Differences in Growth, Feed Utilization and Feathering.
M-33	FACTORS AFFECTING QUALITY OF POULTRY PRODUCTS.
M-33-e	Deterioration in Eggs in Relation to Time and Temperature Changes and a Study of Thermostabilizing Processes.
M-33-f	Changes in Grades of Eggs in Carlot Shipments in Relation to Season, Shipping Distance, Temperature, Time and Other Factors.
M-33-g	Various Levels of Stilbestrol Plus Thiouracil in Finishing Broilers for Market.
M-34	THE EFFICIENCY OF POULTRY IN THE UTILIZATION OF FEED.
M-34-e	Medium Sized Strain of Turkeys with Certain Desirable Qualities.
M-34-f	Developing a Superior Egg and Meat Producing Strain of Chickens Having Columbian Plumage Pattern.
M-35	NUTRITIVE REQUIREMENTS OF POULTRY.
M-35-g	The Requirements of the Growing Chick for Newer Members of the Vitamin B Complex.
M-35-i	Amino Acids in Poultry Nutrition.
M-35-j	The Importance of Fiber in Poultry Rations.
M-36	VIABILITY OF MARYLAND POULTRY.
M-36-d	Developing a Possible Test for the Presence of Avian Leucosis.
M-36-e	The Role of Wheat in Pullet Disease of Chickens.
M-36-f	Response in Feathering in Hybrid and Purebred Fowl Fed Selenium as a Check on Feather Pigment Reactions Due to Leucosis.
M-36-g	Effect of Long Time Thiouracil Treatment on Feather Pigmentation in Brown Leghorns and Other Breeds and Hybrids as a Further Check on Feather-Pigment Reaction Due to Leucosis.
M-43	EFFECT OF HORMONES ON PLUMAGE, GROWTH, FATTENING AND OTHER CHARACTERISTICS IN POULTRY.
M-43-b	Determining Feather Genotype Through Hormone Effects in Lieu of Breeding.
M-44	The Influence of Methods of Dressing and Holding on the Quality of Poultry Meat.

RURAL SOCIOLOGY

S-1	Community and Population Bases in Planning County Library Services.

Financial Statement—July 1, 1947 to June 30, 1948

	FEDERAL FUNDS						
	Hatch	Adams	Purnell	Bankhead-Jones	Research Marketing		
					9b1-9b2	9b3	
Balance June 30, 1947	$	$ .01	$	$ .01	$	$	
Appropriations 1947-48	15,000.00	14,999.99	60,000.00	32,781.36	23,027.77	6,000.00	
	$15,000.00	$15,000.00	$60,000.00	$32,781.37	$23,027.77	$6,000.00	
Receipts from sources other than Federal 1947-48							**For Agr. Investigations***
State Appropriations for Agricultural Investigations							$212,464.00
Industrial Grants							41,247.50
Sales and Miscellaneous							82,936.59
							$336,648.09
Balance brought forward July 1, 1947							82,992.76
Total							$419,640.85
Expenditures:							
Personal Services	$ 8,172.86	$14,000.00	$54,595.02	$29,515.19	$10,220.10	$1,158.87	$153,625.33
Travel	2,699.92	....	....	....	372.34	....	6,574.32
Transportation	....	....	4.08	1.00	30.40	....	745.83
Communication Service	....	....	8.65	....	....	....	905.31
Rents and Utility Services	....	....	....	....	....	....	1,073.08
Printing and Binding	167.75	....	....	....	....	....	1,144.71
Other Contractual Services	....	....	144.89	20.75	750.00	95.00	14,148.88
Supplies and Materials	3,959.17	134.84	3,313.71	2,703.89	2,390.67	309.06	85,753.98
Equipment	....	865.16	1,933.65	537.70	3,828.30	3,216.63	33,501.19
Land and Structures	....	....	....	....	....	....	9,297.37
Contributions to Retirement	....	....	....	....	....	....	....
	$14,999.70	$15,000.00	$60,000.00	$32,778.53	$17,591.81	$4,779.56	$306,770.00
Balances June 30, 1948	.30	....	....	2.84	5,435.96	1,220.44	112,870.85
Totals	$15,000.00	$15,000.00	$60,000.00	$32,781.37	$23,027.77	$6,000.00	$419,640.85

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* Including Bankhead-Jones Offset Funds.

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